

Preparing for the Worst

Disaster Preparedness and Recovery of Digital Materials

Best Practices Exchange 2012

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Overview

- Disaster planning
- Practical protective measures
- Disaster response and recovery



A few questions



Does your organization have

- A disaster management plan?
- A continuity of operations (COOP) plan?



If your organization has a plan

- Have you read it?
- Do you know where to find it?

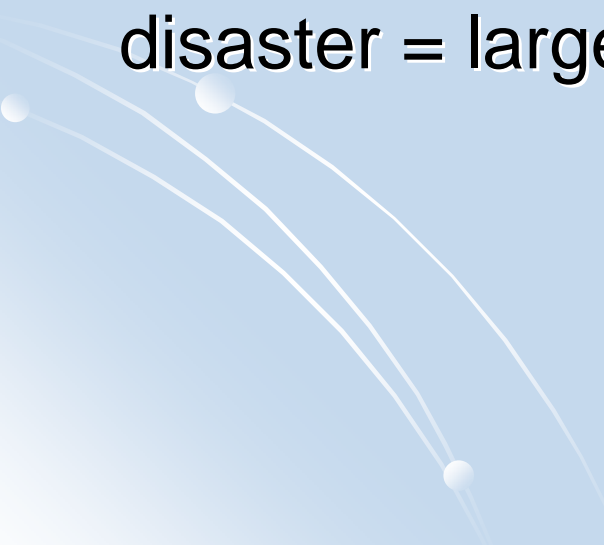


If your organization has a plan

- Does it include your organization's electronic business records?
- Does it include the digital cultural heritage materials your organization holds?



Digital disasters

- Any disaster that affects paper or film may also affect electronic media
 - Paper and film may survive disasters that completely destroy electronic media
 - High-capacity electronic media + highly localized disaster = large-scale data loss
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Fire or high heat

- Can ruin hardware and storage media
 - Plastic starts melting at 125 °- 150 ° F
- Internal hard drives most likely to survive



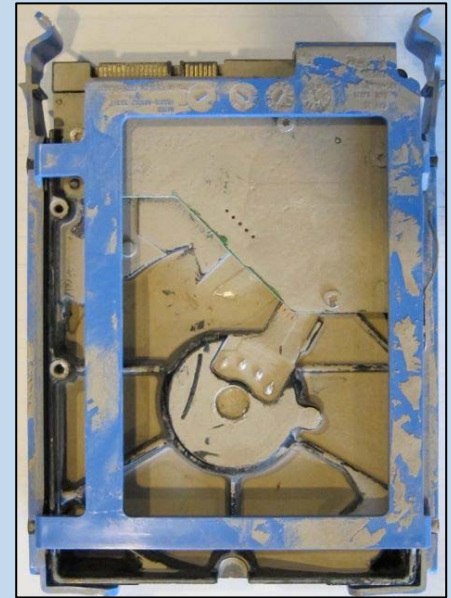
Building collapse

- Media may survive relatively unscathed
- Media may be destroyed beyond all hope of recovery
- Substantial delay before salvage and stabilization begins

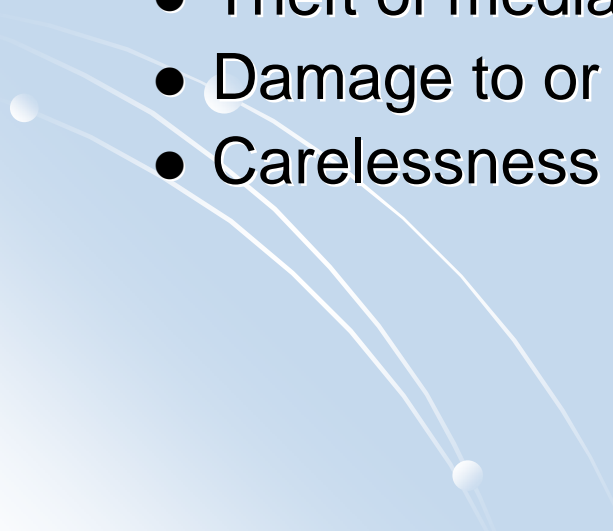


Water

- Most common type of digital disaster
- May damage media directly
- May serve as a conduit for electricity
- May be accompanied by contaminants
- May promote growth of mold
- May accompany other types of disasters
 - Used to fight fire
 - Used to keep down dust from collapsed structures
 - *If burned or crushed media get wet, treat as water-damaged*



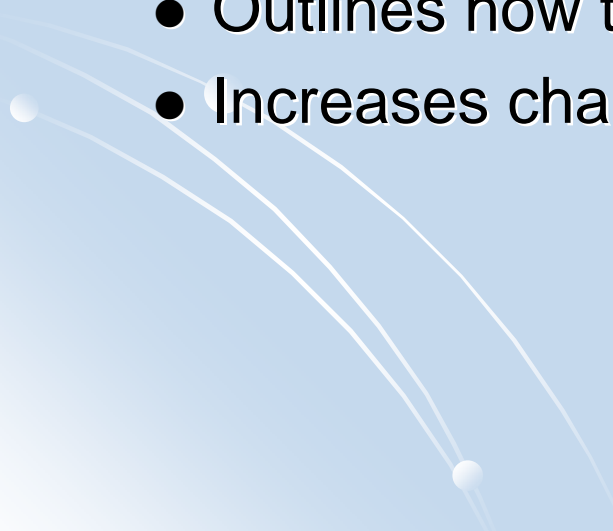
Human risks

- May be internal or external
 - Many different types
 - Unauthorized accessing of data
 - Unauthorized alteration or destruction of data
 - Unauthorized destruction of media or hardware
 - Theft of media or hardware
 - Damage to or destruction of facilities
 - Carelessness
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Disaster planning



Develop disaster management plan

- A good plan
 - Identifies most important business records and cultural heritage content
 - Analyzes risks to content
 - Determines how to reduce risks
 - Outlines how to respond if disaster strikes
 - Increases chance of safe, speedy recovery process
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Identify vital records

- Support your core business operations
- Document your rights and assets
 - Open contracts
 - Building project records
 - Transfer agreements and deeds of gift



Identify priority content

- If forced to choose, what would you save?
 - Content documenting citizen rights and assets
 - Property records
 - Student records
 - Employment or service records
 - Mission statement and collecting policy priorities
 - May be content created by your parent organization
 - May be content held by few other libraries
 - May be content that supports ongoing faculty/staff research
 - May be content generated by key creators (e.g., Governor)

Assess geographic/climatic risks

- Storms
- Flood
- Earthquake
- Wildfire

Do your research!

Homer Simpson: Oh, Lisa, there's no record of a hurricane ever hitting Springfield.


Lisa Simpson: Yes, but the records only go back to 1978, when the Hall of Records was mysteriously blown away!

The Simpsons ("Hurricane Neddy," 1996)

Assess site risks

- In or close to floodplain
- Close to a stream, river, or coastline
- Close to or below sea level
- Below levies or dams
- Large trees nearby
- Close to forested area
- Other potential hazards nearby
 - Chemical plant
 - Railroad tracks
 - Terrorist target

Assess building risks

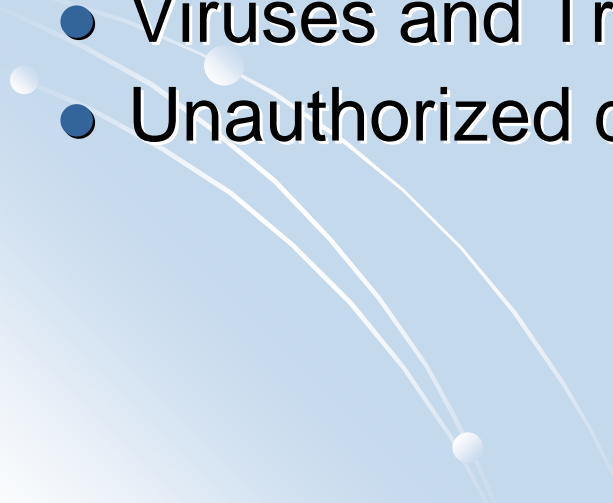
- Power failure
 - Faulty wiring or transformer
 - Leaky or burst water, steam, or sewer pipes
 - Gas lines
 - Flat or leaky roof
 - Leaky windows
 - Blocked gutters
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Assess human risks

- Tampering
- Vandalism
- Terrorism
- Carelessness



Assess digital-specific risks


- Media failure
 - Accidental deletion
 - Magnetic fields
 - Loss or theft of hardware or media
 - Tampering
 - Viruses and Trojan Horses
 - Unauthorized disclosure
- 

Document essential resources

- Fire extinguishers and hoses
- Gas and water turn-off valves
- Electrical system and alarm shut-off switches
- Emergency response kits



Inventory physical assets

- Hardware serial numbers and staff assignments
 - Floodwater may sweep computers off desks
 - First responders may unplug computers and move them around
 - Fans, generators, and other equipment that might be needed in the wake of a disaster
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Compile response resources

- Disaster management plan
 - Keep a copy in a secure offsite location!
- Key contact lists
 - Staff, first responders, recovery vendors
 - Keep a copy with you!
- Information about nearby emergency shelters
- Records relating to hazardous materials
- Physical assets inventory
- Maps and building plans
- Insurance records

When your plan is completed

- Conduct tabletop exercise and revise plan as needed
- Distribute plan and train staff
- Review plan periodically



For more information

- New York State Archives, *Preparing for the Worst: Managing Records Disasters*
 - http://www.archives.nysed.gov/a/records/mr_pub82.shtml
- Northeast Document Conservation Center, *Disaster Planning*
 - http://www.nedcc.org/resources/leaflets/3Emergency_Management/03DisasterPlanning.php
- Council of State Archivists, Emergency Preparedness Initiative
 - <http://www.statearchivists.org/prepare/index.htm>
- Johanna Wellheiser and Jude Scott, *An Ounce of Prevention: Integrated Disaster Planning for Archives, Libraries, and Records Centers*
 - Available from Society of American Archivists, Amazon.com, and other vendors

Practical protective measures



Reduce immediate risks

- Avoid keeping hardware and media
 - In basements or attics
 - Directly on on the floor
 - Directly under pipes
- Improve security
 - Keep media and hardware secured

Reach out

- Press building management for improvements
 - Small changes may make a big difference
 - Educate them about your holdings
- Establish relationship with local first responders
 - Educate them about your holdings
 - Ask them how to further reduce risk
- Consult local and state emergency management offices
 - May have helpful resources and connections
 - Conduit for federal disaster assistance
 - Educate them re: salvage of cultural heritage materials
- Cultivate partnerships
 - Other state agencies may have essential resources

Assemble disaster response kits

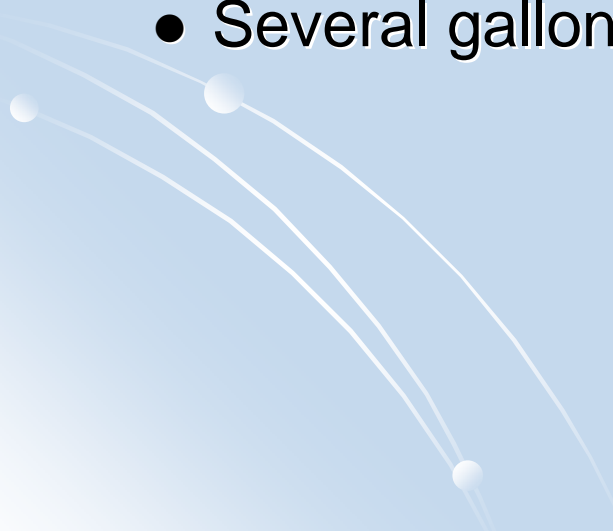
- General supplies

- Gloves
 - Heavy-duty work
 - Surgical
- Extra records storage boxes
- Industrial fans
- Plastic sheeting
- Waterproof tape
- Portable sump pump
- Permanent marker

- Documentation supplies

- Preprinted forms
- Notepads
- Pens or pencils
- Camera

Assemble disaster response kits

- Digital disaster supplies
 - Gallon-sized zippered storage bags
 - 45-gallon or larger plastic trash bags
 - Lidded plastic storage containers
 - Clean, lint-free cotton cloths
 - Several gallons of distilled water
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Create backups

- It is **easier and cheaper** to recover digital content from backup media
- Make sure your backups are readable and complete
- Store backups in geographically distant location



If major storm is imminent

- Produce backups
 - Move to remote storage if at all possible
 - If storing locally
 - Seal in zippered storage bags
 - Keep in area least likely to be affected
- Protect hardware
 - Move off floor and away from windows
 - Move into interior room if possible
 - Move to second story or higher if possible
 - Cover with plastic bags or taped-down plastic sheeting
- Protect yourself and your colleagues
 - Human life is more valuable than content


Disaster response and recovery



A few questions . . .



Have you ever had a digital disaster?

- How did you respond to it?
 - What aspect of the disaster – or your response – most surprised you?
 - Did you lose essential records or content?
 - What lessons did you learn?
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Salvage

- First phase of digital disaster response
 - Physical retrieval and relocation of damaged devices and media



Before salvage begins

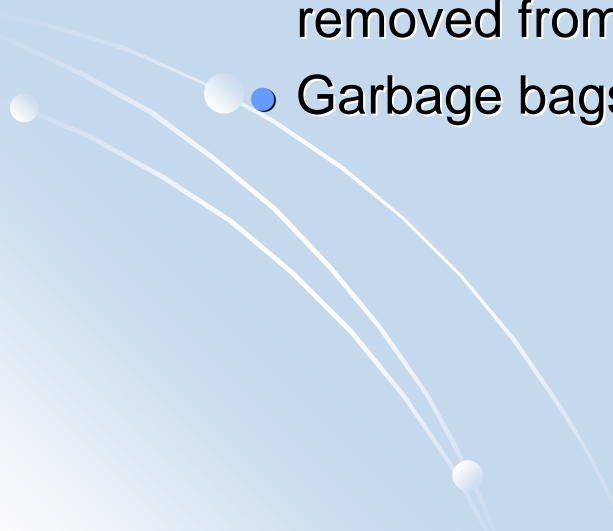
- Identify a safe, clean, secure work space
 - For stabilization of damaged media and hardware
- Work with first responders
 - They're the safety experts
 - Areas that look safe might not be
 - You know your content and your facility
 - They may want to discard damaged paper and media
 - You know where to find essential resources
 - You know where important records and content are located
- Contact local and state emergency management offices
 - May be able to provide needed resources
 - Link to federal assistance for cultural heritage organizations

Stabilization

- Second phase of response
 - Halting or slowing damage to media
 - Buys time while you determine recovery approach



Water-damaged magnetic hard drives

- Wipe surface with clean cotton cloth
 - Don't rinse drive
 - Don't allow drive to dry out
 - Seal in plastic bag
 - Zippered storage bags for portable hard drives or drives removed from computers
 - Garbage bags for computers and servers
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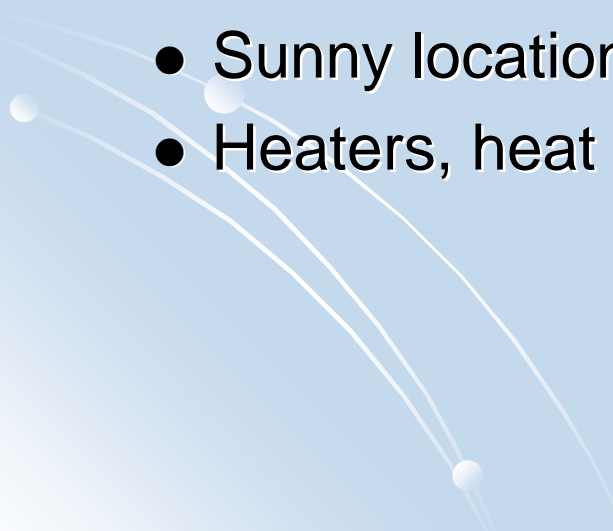
Water-damaged magnetic tape

- Wipe surface with clean cotton cloth
- If tapes are still wet, rinse twice with distilled water
 - If storm or flood water contained contaminants, keep wet
 - If storm or flood water was clean, air dry
 - Fans and dehumidifiers are okay
 - Heaters, heat lamps, etc., are not

Water-damaged optical media

- Rinse twice with distilled water
 - If dirt remains, gently moisten clean, lint-free cotton cloth and wipe disc from center to spine, then rinse
- Air dry
 - Place on clean, lint-free cotton cloths or in a rack
 - Fans and dehumidifiers are okay
 - Heaters, heat lamps, etc., are not

Water-damaged solid-state media and devices

- Wipe surface with clean, lint-free cotton cloth
 - Do not rinse
 - Air dry
 - Devices can be propped up to facilitate drainage
 - Fans and dehumidifiers are okay
 - Sunny locations are okay
 - Heaters, heat lamps, etc., are not
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Recovery

- Restoring content to its pre-disaster state
 - Ideally, will involve retrieving data from complete and readable backup media
 - May involve transferring data from damaged devices and media onto new media
 - Done only if the value of data warrants cost of recovery
 - In-house recovery of data on an optical disc or solid-state media may cost less than \$20 (labor included!)
 - Vendor recovery of data on a magnetic hard drive may cost more than \$10,000

Optical media

- Data is not mission-critical and discs are clean and unscratched
 - In-house recovery
 - Attempt to read stabilized discs
 - Copy data onto new media
 - Securely dispose of damaged media
- Data is mission-critical
 - Work with qualified vendor

Solid-state media (not devices!)

- Data is not mission-critical and media is clean and physically intact
 - In-house recovery
 - Attempt to read stabilized media
 - Copy data onto new media
 - Securely dispose of damaged media
- Data is mission-critical
 - Work with qualified vendor

Hard drives, magnetic tape, and solid-state devices

- Always work with qualified vendor
 - Attempting to read damaged drives or tapes will likely destroy both media and hardware
 - Attempting to operate a damaged solid-state device may destroy device and injure you



Establishing vendor relationship

- Contact as soon as possible
 - Most vendors have 24/7 phone coverage
 - The sooner recovery begins, the greater the chance of successful recovery
 - Especially true for magnetic hard drives in contact with seawater
- Ask whether all work will be done in one facility
 - Vendors that have separate assessment and recovery facilities may charge more
- Vendors may
 - Provide additional stabilization/recovery advice
 - Have special handling or packing instructions
 - Offer pick-up service
 - Offer discounts to government customers

Outline verbally, confirm in writing

- Health and safety issues
 - Vendor needs to know whether sewage or hazardous chemicals might be present
- Timetable and fee schedule
 - Vendor will typically examine media, then furnish estimate
 - Some vendors charge an initial exam fee, others don't
 - Some vendors have “no data, no charge” provisions
- Recovery and copying procedures
 - Recovered data conveyed in agreed-upon format(s) on agreed-upon media
 - Appropriate, industry-accepted methods and procedures

Outline verbally, confirm in writing


- Security certifications

- Vendor will document custody of media from receipt to destruction
- Media and data will be accessible only to personnel performing recovery work
- Vendor will never release data or make it accessible to third parties
- After client confirms that recovered data has been received and reviewed, vendor will destroy original media and delete all copies of data in ways that prohibit reconstruction

Outline verbally, confirm in writing

- Return arrangements and reporting requirements
 - Shipping method
 - Shipping manifest containing media serial number(s)
 - If sending multiple pieces of damaged media
 - Itemized documentation indicating whether data on a given piece of media could be recovered
 - Written report detailing overall success of recovery effort
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Shipping of damaged media

- Follow vendor instructions
 - Some vendors want only one piece of media per box or envelope
 - Some will provide special instructions
 - Some will pick up media
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General shipping guidelines

- Place media in zippered storage bag or sealed trash bag
- Surround each piece of media with bubble wrap
- Pack appropriately
 - Portable media
 - Place in rigid envelope or in box at least twice as large as media
 - If using a box, immobilize media with peanuts or other packing material
 - Hard drives and solid-state devices
 - Place in box at least twice as large as drive or device
 - Immobilize with peanuts or other packing material
- Ship via overnight delivery service

More information

- Association of Moving Image Archivists
 - *Fact Sheet 13: Disaster Preparedness and Response*
 - http://www.amianet.org/resources/guides/fact_sheets.pdf
 - Salvage of analog audio and video cassettes
- Library of Congress
 - *Preserving Your Treasures After a Disaster*
 - <http://www.loc.gov/preservation/family/ftpreserv.html>
 - Aimed at individuals recovering family treasures
 - Includes videos demonstrating how to rinse optical discs, audio cassettes, and video cassettes
 - Includes information about recovery of hard drives

More information

- National Archives and Records Administration
 - *Records Emergency Information: CDs and DVDs*
 - <http://www.archives.gov/preservation/records-emergency/pdf/optical-media.pdf>
 - *Records Emergency Information: Diskettes (Floppy disks)*
 - <http://www.archives.gov/preservation/records-emergency/pdf/magnetic-media.pdf>
 - *Records Emergency Information: Hard Drives*
 - <http://www.archives.gov/preservation/records-emergency/pdf/electronic-media.pdf>

More information

- Specs Brothers
 - *Hurricane and Flood Recovery Advice*
 - http://www.specsbros.com/h_flood.htm
 - Stabilization and recovery of all forms of magnetic tape
- Kara van Malssen
 - *Disaster Planning and Recovery: Post-Katrina Lessons for Mixed Media Collections* (M.A. thesis, New York University, 2006)
 - http://www.nyu.edu/tisch/preservation/program/student_work/2006spring/06s_thesis_vanmalssen_a.doc
 - Stabilization and recovery of all forms of magnetic tape
 - Detailed case studies of several New Orleans repositories affected by Hurricane Katrina